Site 54 Red Gate Marsh

Overview: The Red Gate Marsh potential restoration site is located on the Newbury/Rowley town line. The site lies to the east of Red Gate and Old Rowley Roads and to the west of Route 1A. The potential restoration site encompasses approximately 50 ac of primarily salt marsh upstream of two primary culverts under Route 1A. One is located just south of the town line and the second is located approximately 450 ft to the north. A third smaller culvert under Route 1A is located a similar distance to the south but appears to have reduced hydraulic capacity due to the small creek dimensions downstream of the highway. Tidal flow within the northwestern limits of the marsh will be enhanced shortly with the planned construction of a new 36 in. concrete box culvert under Old Rowley Road as off-site mitigation by the MBTA. The culvert itself was installed in the summer of 2005. It will not be functional until connecting ditches are excavated by the Mosquito Control District. This additional work is scheduled for the spring of 2006. However, the small size and location of the culvert in the upper reaches of the marsh is only anticipated to benefit a small portion of the entire site. Mosquito Control District also recently installed a 36 in corrugated plastic pipe under Red Gate Road leading toward a large brackish marsh. This wetland area lies just south of the capped landfill. A large stand of *Phragmites* extends into the brackish marsh from the base of the landfill. The remaining portion is dominated by *Typha*. This culvert appears to have little effect on species composition within the brackish system but will promote better drainage of impounded fresh water. Mosquito Control District personnel have observed tidal flow through the MBTA railroad embankment entering this portion of the marsh but no culvert is visible.

All the roadways surrounding the area are early town/county roads and are shown on the 1894 USGS Newburyport-Exeter, NH-MA Quadrangle map. The creeks which flow under Route 1A are part of Mud Creek which enters Plum Island Sound approximately 1.6 mi east of the Route 1A. Despite the presence of several culverts, flow into the potential restoration site is restricted during most tides. Tide gauge data collected by the WRP in November of 2004 at one culvert documented restrictions on the order of 1.0 to 1.5 ft. Other evidence of a tidal restriction includes: scouring downstream of the crossing, bank erosion, observed subsidence of the high marsh plain (approximately 0.5 feet) and limited populations of *Phragmites.* There is also evidence of a recent storm event which impounded ocean waters within the potential restoration site, causing die back of low-lying woody vegetation (primarily red cedar) bordering the marsh. There is also a pronounced decrease in the typical dimensions of the two primary creeks upstream of the Route 1A. The approximate width of the creek located at the town line is 8 ft and 16 ft upstream and downstream, respectively. The approximate width of the larger creek to the north is 10 ft and 28 ft, respectively.

Most of the marsh area contained in Rowley is mapped as private conservation lands. The majority of the restoration area does not have a conservation status and is privately held. The salt marshes along Plum Island Sound approximately 0.25 mi to the east are federally-owned. The right-of-way associated with Route 1A is under the control of MassHighway.

Structure conditions: Route 1A is in good condition and is typically 40 ft wide with paved shoulders and steel single beam guardrail along the embankment. The culvert under Route 1A at the Newbury/Rowley town line is a 36 in RCP, the culvert 450 ft north is a 24 in RCP. Both culverts are approximately 60 ft in length. Both culverts were replaced in 2000 and are generally in good condition. Riprap and concrete end sections protect the creek and roadway embankment from scour at both culverts. The inverts of both culverts are not consistent with the upstream and downstream creek elevations which cause some impoundment within the upstream creek during

ebb conditions. The 36 in culvert is somewhat poorly aligned with the existing creek upstream of the roadway.

Ecological Integrity: The potential restoration site generally has a medium level of ecological integrity. A portion of the marsh in Rowley includes private conservation lands. The site is contained within the Parker River/Essex Bay ACEC and BioMap Core Habitat. Much of the surrounding forest lands are mapped as Supporting Natural Landscape. The value of these uplands is reduced by the extent of low density residential development on the adjacent side streets. The southern limit of the marsh is bordered by agricultural fields although no signs of water quality impairments were observed. Mud Creek downstream of the potential restoration site is mapped as suitable habitat for American oyster and soft-shelled clams.

Evidence of ongoing haying was observed within portions of the site. The marsh has a relatively high density of long, narrow lateral ditches which allow for more efficient haying operations. The southern extent of the site contains a few larger pannes which are the result of unmaintained ditches. However, the majority of the ditching on the marsh has been well maintained and as a result the potential restoration site supports a high portion of *S. patens*-dominated high marsh and a limited the number and size of existing salt pannes.

In addition to the large stand of *Phragmites* found to the west of Red Gate Road, there are substantial stands fringing uplands to the east. These stands will likely expand without control measures. Areas of *Phragmites* along with larger patches of *Iva* are more commonly observed upstream of the restriction. The elevated invert above the creek bed restricts fish passage over the lower portion of the flood tide. Mud Creek is mapped as suitable habitat for American oyster and soft shell clam.

Tide gauges deployed in mid November of 2004 by the WRP at the larger culvert near the town line documented restrictions on the order of 1.0 to 1.5 ft which increased as tidal prism increases. The highest recorded tide downstream of the culvert occurred on November 13 with a resulting tidal dampening of 1.5 ft or approximately 19% of the total tidal prism recorded at the downstream gauge. Restrictions during typical spring tide events would be in the range of a 0.75 ft restriction. The overall severity of the existing impairments is considered moderate. A reduction in the tidal restriction with the replacement of at least one of the existing primary culverts with a larger structure set lower in the channel would reduce the observed bank erosion, limit the expansion of the small fringing populations of *Phragmites* along with other brackish marsh vegetation and allow the marsh plain to increase in elevation in response to rises in sea level. Limited conversion of other wetland communities including freshwater marsh/wet meadow and shrub swamp to salt marsh or brackish marsh are anticipated. Relatively small areas of forested wetland are likely to remain unaffected. No impacts to abutting developed lands are anticipated. However, a more detailed investigation of two properties along Old Rowley Road which appear to be relatively low-lying is necessary to confirm this assumption.

Socioeconomic: Although the overall good ecological integrity and extent of available habitat create good wildlife viewing potential, recreational values are low as no access is currently available or planned. Educational opportunities are limited as there is no known ongoing research, nearby schools, or available access. The potential restoration site's Uniqueness/Heritage value is enhanced by its inclusion within the Parker River/Essex Bay ACEC. The site does not include any known cultural resource elements or urban setting values.

Construction Logistics/Feasibility: The restoration potential for this site is enhanced by several factors including: the potential to detour traffic around the work site, lack of utilities, the extent of

the existing tidal restriction, the relatively large area that would benefit and the fact that several restoration actions have already occurred within the marsh. The relatively small incremental benefits derived from these efforts would be greatly enhanced by a substantial increase in tidal exchange under Route 1A. With a detour there would be excellent construction access and staging along the closed segment of the road. The restoration potential is affected by the possibility of a low lying property off Red Gate Road, the fact that two new culverts may be required and the relatively good condition of both culverts having been replaced in 2000. For cost estimating purposes, we have assumed the project would involve the replacement of a single culvert within the largest creek. The project would also involve work on the marsh to provide better hydraulic connections between both creek systems. Assuming MassHighway and the towns would allow for a detour of traffic, there are no major factors present which would escalate costs over a typical large culvert replacement project. However, based on downstream creek dimensions, a relatively large box culvert (approximately 12 by 10 feet) is likely necessary to alleviate most of the restriction. Total construction costs are estimated to be in the range of $625,000. The level of local support for this effort is unknown at his time.

Restoration Potential: The site is considered to have high restoration potential. Positive factors include the severity of documented impairments (including approximately 0.5 ft of subsidence), the restoration area within an important watershed and ACEC, and relatively straight forward construction with limited utilities and detour potential. Although the potential restoration site currently has a medium level of ecological integrity and is included within the Parker River/Essex Bay ACEC, there is the distinct potential for many of the observed impairments to worsen without restorative actions. Increasing tidal flow under Route 1A will also increase the effectiveness of the other culverts recently replaced under Red Gate Road. The restoration potential is somewhat limited by the overall construction costs associated with the replacement of a large structure under a state-controlled highway and the overall good condition of the existing culverts. Key steps toward implementation include seeking local (municipal), MassHighway, and property owner support along with identifying funding sources for a refined feasibility and modeling study. This effort would document the extent of restrictions at both culverts, assess the benefits of replacing only a single structure, and verify the elevations of buildings near the marsh.

Site # 054 | Site Features | Scale: 1:2,500

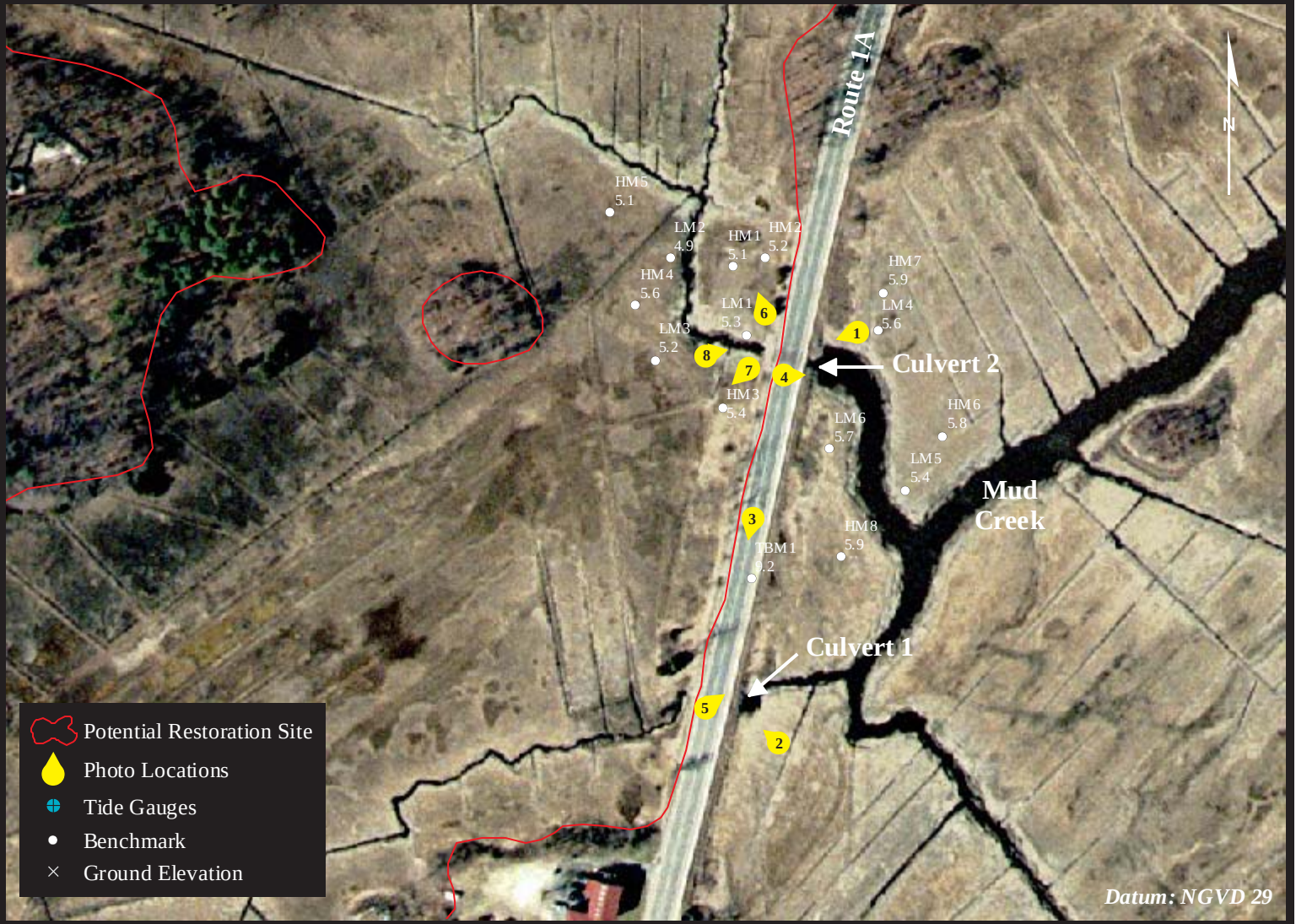

Photo 1 - View of Downstream End of Northern Culvert Crossing

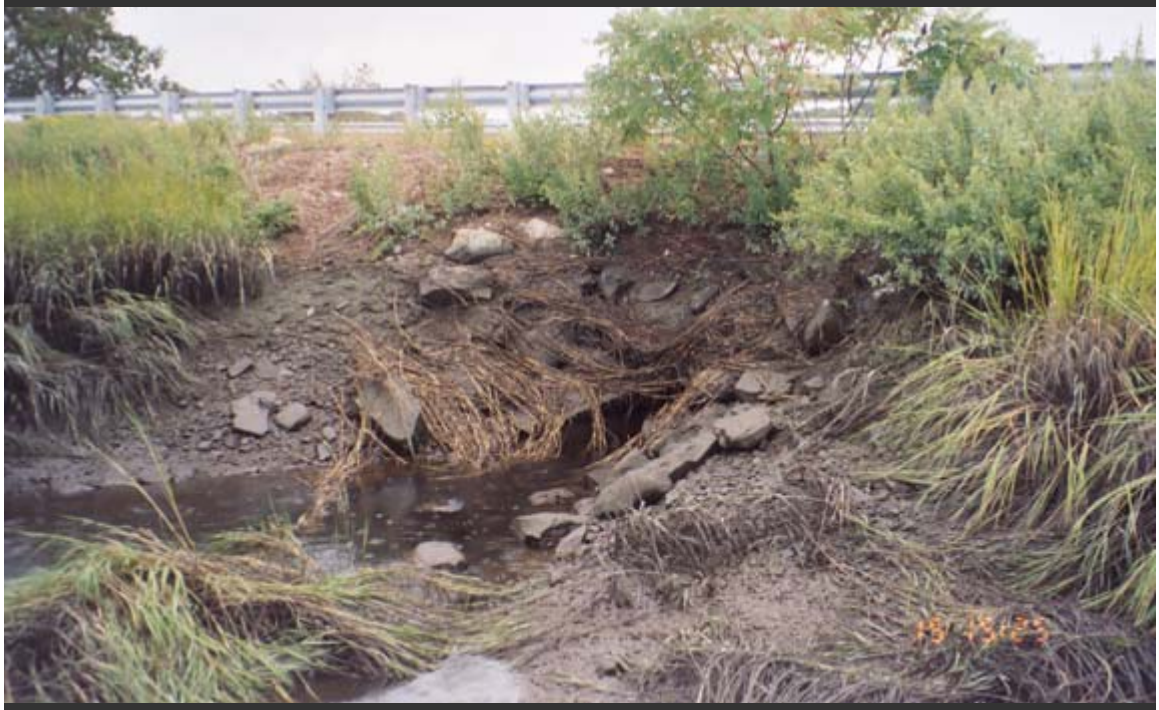

Photo 2 - View of Downstream End of Southern Culvert

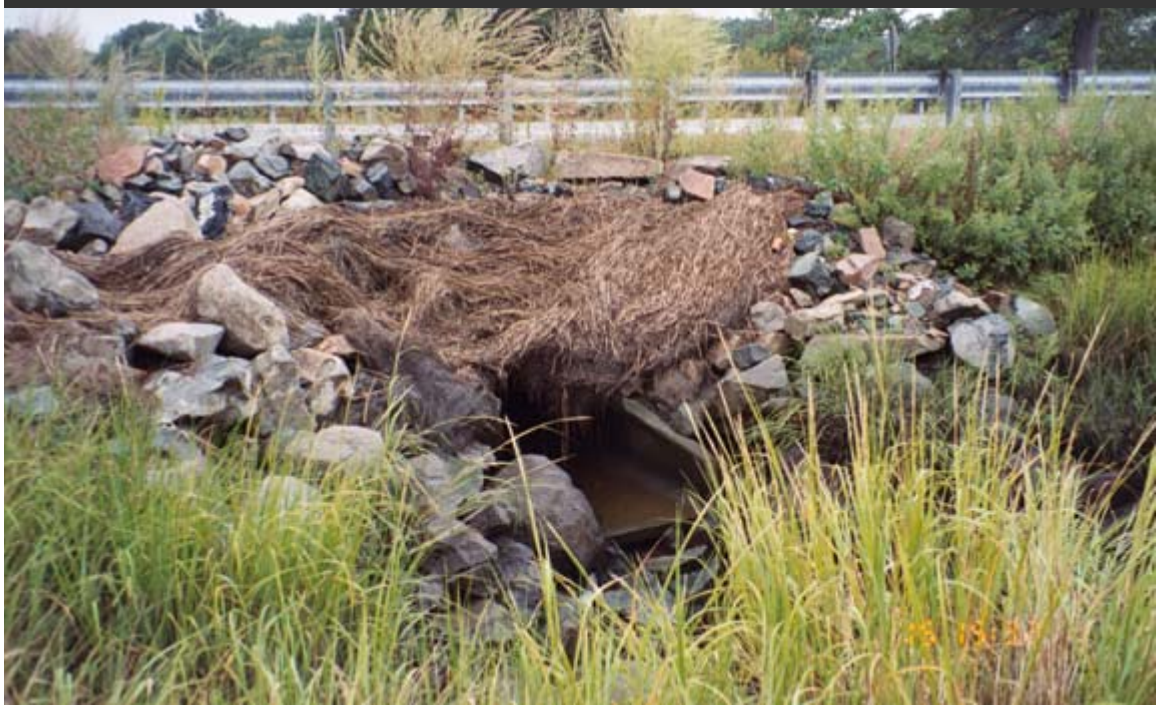

Photo 3 - Route 1A at Crossing Viewing South

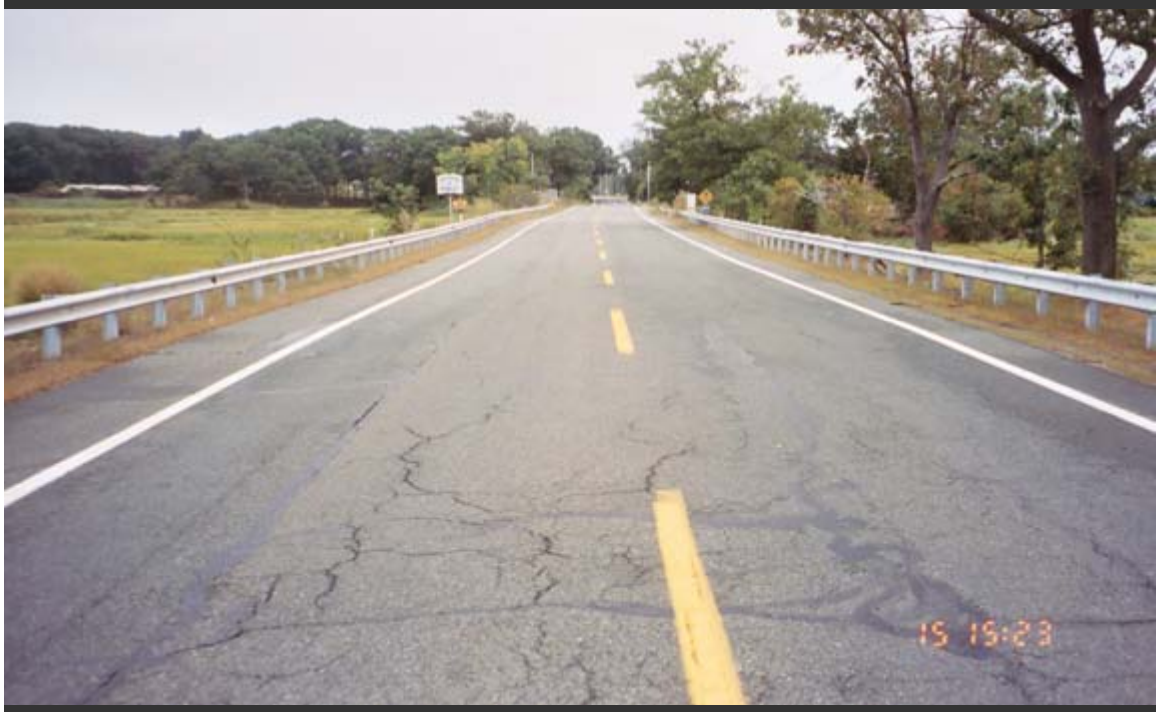

Photo 4 - View of Downstream Marsh at Northern Crossing

Photo 5 - View of Marsh Downstream of Southern Culvert Viewing Northeast

Photo 6 - View of Marsh Upstream of Northern Culvert Crossing Viewing Northwest

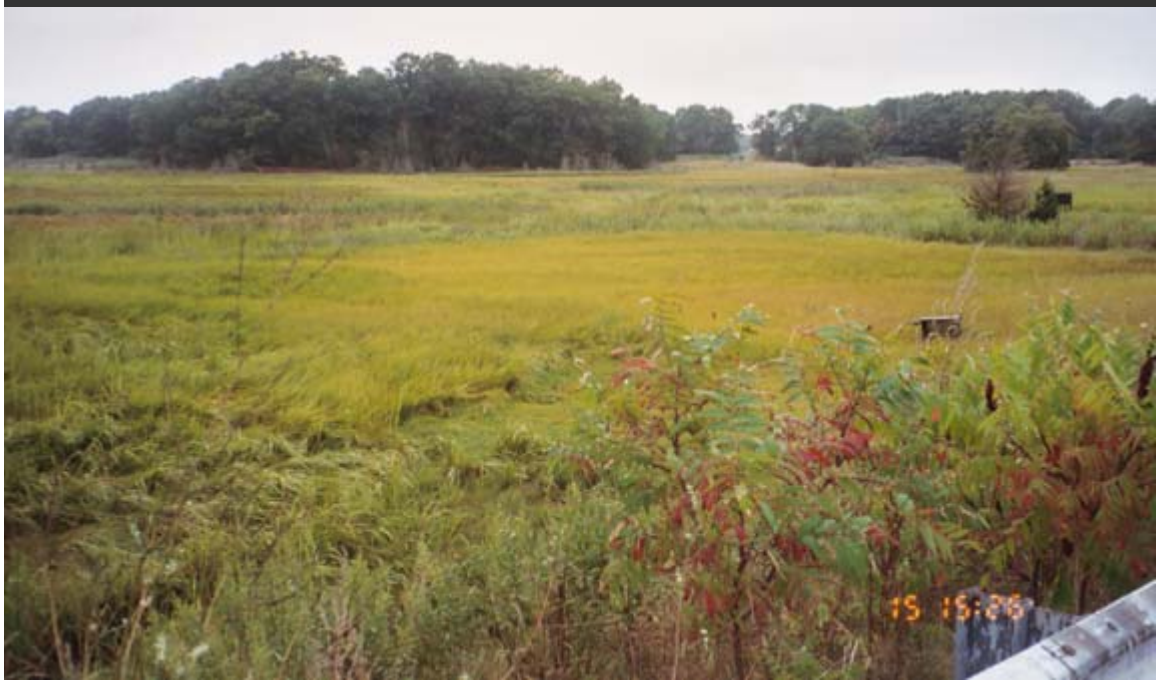

Photo 7 - View of Marsh Upstream of Northern Culvert Crossing Viewing Southwest

Photo 8 - View of Upstream End of the Northern Culvert

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 54
Red Gate Marsh

Site Information

Site ID:	54
Site Name:	Red Gate Marsh
Municipality	Newbury/Rowley
Location:	West of Route 1A on Newburt/Rowley town line
Adjacent Waterbody:	Parker River

Affected Area (Acres)

Mudflat/Open Water:	0	Total Area:	65.6
Salt Marsh:	65.3		
Other Wetland:	0.3	*Other Description:*	
Other:	0		

Impairment(s)

Tidal Restriction	☑	Fill	☐
Obstructed Ditche(s)	☑	Invasive Species	☑
Impoundment	☐	Pollution / Siltation	☐

Severity of Impairments: Moderate

Project Type

Roadway Culvert(s)	☑	Obstructed Ditches	☑
Bridge	☐	Fill	☐
Berm	☐	Other	

Evidence of Restriction

Gauge Data	☑	Impounded Flow	☐
Downstream Scour Pool	☑	Obstructed Flow	☑
Upstream Scour Pool	☐	Invasive Species	☑
Bank Erosion	☑	Ponded Conditions	☐
Slumping	☐	Subsidence	☑

Structure / Channel:

Overall Condition:	Good
Life Expectancy (Years):	50
Road Condition:	Good
Structure Type:	RCP culerts
Structure Age (Years)	5
Structure 1 Width (Feet):	3
Structure 1 Length (Feet):	60
Structure 2 Width (Feet):	2
Structure 2 Length (Feet):	60
Skew (Degrees):	0
Cover (Feet):	8.5
Scour Protectection:	☑
Adequately Aligned:	☑
Headwall Type:	None
Headwalll Condition:	None

Ecological Integrity / Habitat Value

Surrounding Land Use %

Commercial / Industrial	0
Residential	0
Agricultural	0
Undeveloped	0

Severity of Impairment(s)	Moderate
Invasive Plant Cover:	Low
Extent of Wooded Buffer:	Fair
Habitat Connectivity:	Good
NHESP Estimated Habitats of Rare Wildlife:	☐
NHESP Priority Habitats of Rare Species:	☐
NHESP BioMap Core Habitat:	☑
NHESP BioMap Supporting Natural Landscape:	☑
ACEC:	☑
Anadromous Fish:	☐
Shellfishing Suitability:	☑
Barriers to Fish Passage	Minimal

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 54
Red Gate Marsh

Construction Logistics / Feasibility

Traffic Volume	High
Detour Potential	☑
Site Access	Good
Staging Areas	☑
Fill Material Concern	Minimal
Low Lying Property Concerns	Moderate
Overhead Utility Constraint	None

Underground Utilities

Water	☐	*Telephone*	☐
Gas	☑	*Sewer*	☐
Electric	☐	*Drainage*	☐

Permitting Complexity	Medium
Local Support	Unknown
Feasibility Cost	30,000
Design Cost	40,000
Permitting Cost	25,000
Construction Cost	625,000
Total Cost	780,000
Relative Cost/Acre	12,000

Socioeconomic

Recreation

Public Access:	☐
Watercraft / Portage:	☐
Wildlife Viewing:	☑

Education

Schools Nearby:	☐
Ongoing Research:	☐
Education / Outreach Potential:	Low
Saftey Concerns (Access):	Medium

Uniqueness / Heritage Value

Rare Species Habitat:	☐
ACEC:	☑
Cultural Resource Features	☐
Urban Viewscape Value:	None
Urban Habitat Value:	None

Tide Surveys

	Start:		*Finish:*
Dates of 1st Survey:		-	
Date of Highest Tide:			
Max Measured Tidal Dampening:			
Percent of Tidal Prism:			
Measured Delay:			

	Start:		*Finish:*
Dates of 2nd Survey:		-	
Date of Highest Tide:			
Max Measured Tidal Dampening:			
Percent of Tidal Prism:			
Measured Delay:			

Summary

Uniqueness / Heritage Value:	Medium	Ecological Integrity:	Medium
Recreational Value:	Low	Logistics / Feasibility:	Medium
Educational Value:	Low		
		Restoration Potential:	High